

HWT-DTC Collaboration:

Discussion of 2009 Spring Experiment & Anticipated 2010 Evaluation Activities

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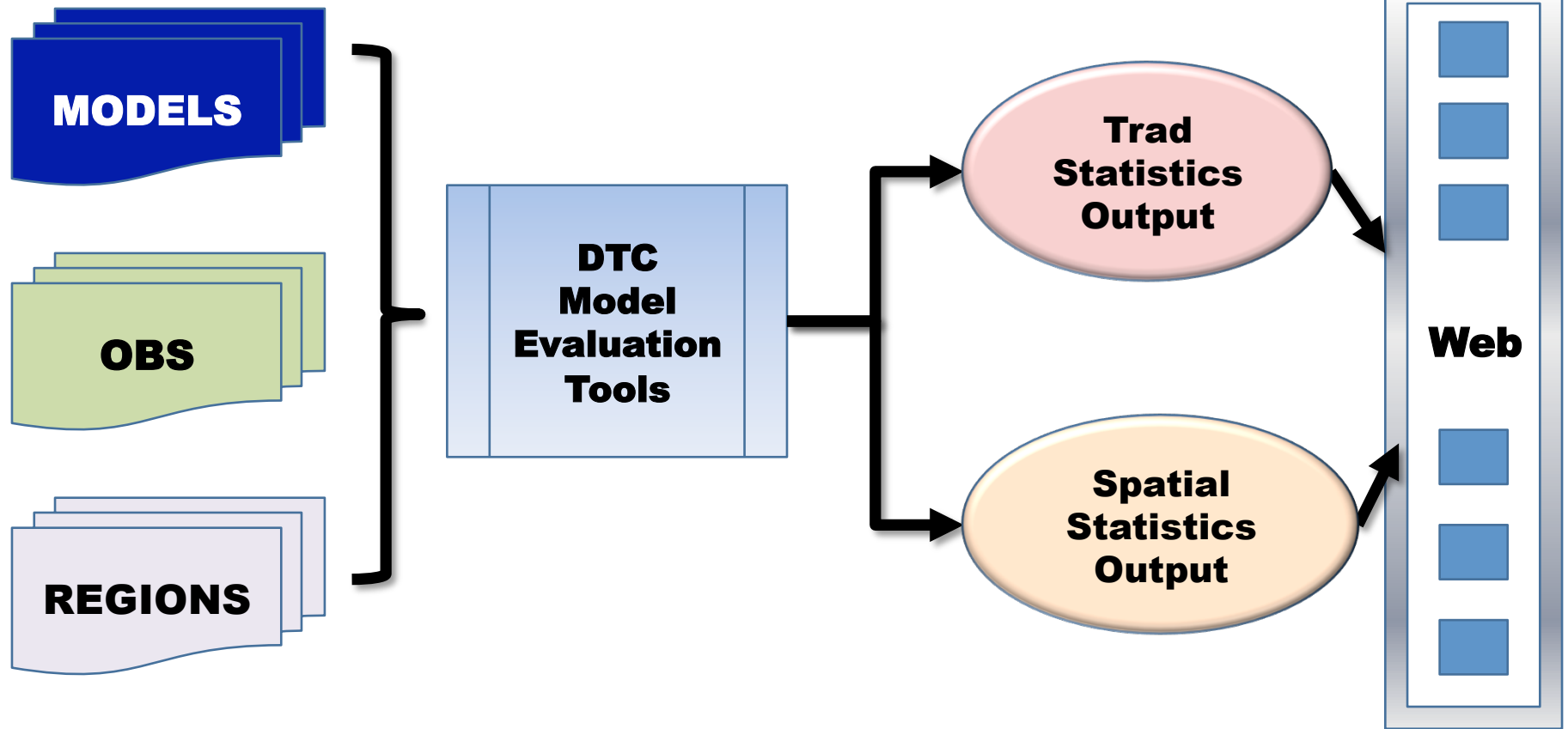


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HWT-DTC Collaboration Objectives

- **Supplement** HWT Spring Experiment **subjective assessments**
- **Provide objective evaluation** of experimental forecasts contributed to Spring Experiment
- **Expose the forecasters** and researchers **to both traditional and new approaches for verifying forecasts**
- **Assist HWT in developing their recommendations for model improvements** and investigating other research topics





General Approach for Objective Evaluation of Contributed Research Models



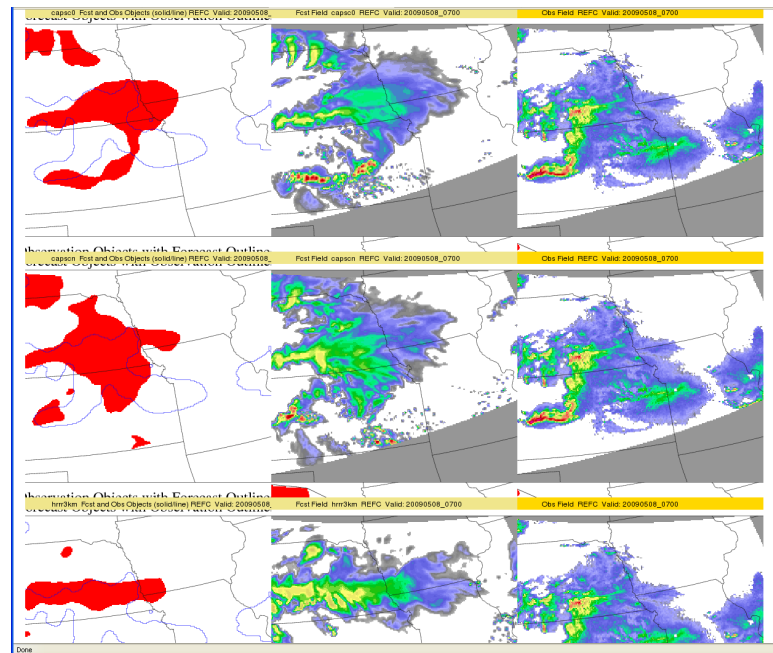
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SE 2009 Evaluation

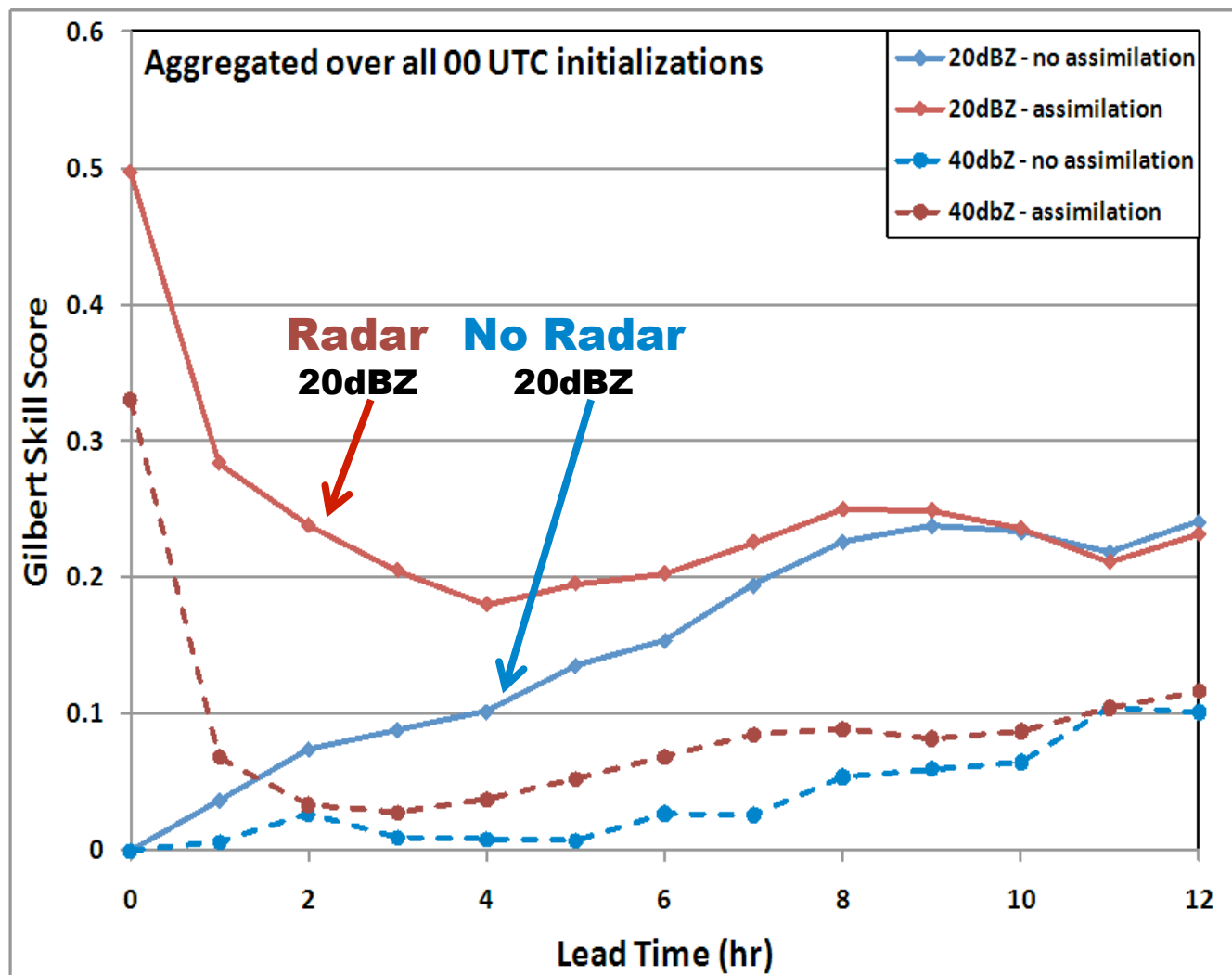
- ❑ Composite reflectivity and 1-hr Accum. Precip. Forecasts
- ❑ NSSL NMQ-Q2 observed fields
- ❑ 3 high-resolution models
 - ❑ CAPS 4km SSEF control (with assimilation including radar)
 - ❑ CAPS 4km SSEF perturbation (no assimilation)
 - ❑ HRRR 3km (different radar assimilation)

Question:

How does radar assimilation impact 0-12hr forecast?



Preliminary 2009 Results



RESULTS:

Radar assimilation appears to improve 0-6hr skill scores

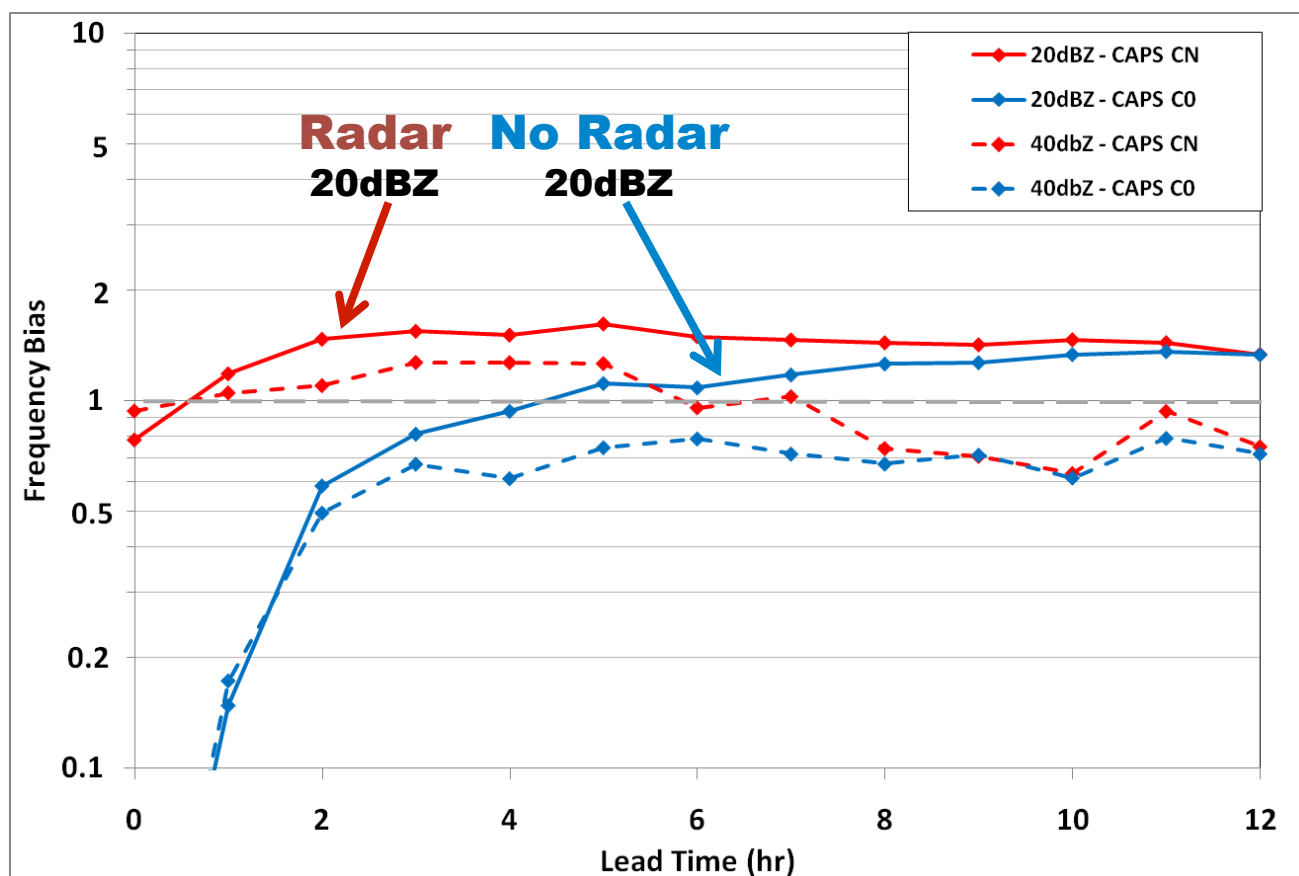
Lack of clear difference in skill scores during 6-12 hr lead times suggests model physics taking over



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Results were aggregated over Spring Experiment time period and the median values are plotted

Preliminary 2009 Results



Frequency Bias:

Freq of fcst event /
Freq of obs event

Assimilation

Over-fcst > 20 dBZ

Over-fcst > 40 dBZ

0-5 hr

Under-fcst > 40 dBZ

6-12 hrs

No assimilation

Under-fcst > 20 dBZ

0-4 hr

Over-fcst > 20 dBZ

0-5 hr

Under-fcst > 40 dBZ

NOTE:

Lack of clear
difference after lead
time of 8hrs



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Results were aggregated over Spring Experiment
time period and the median values are plotted

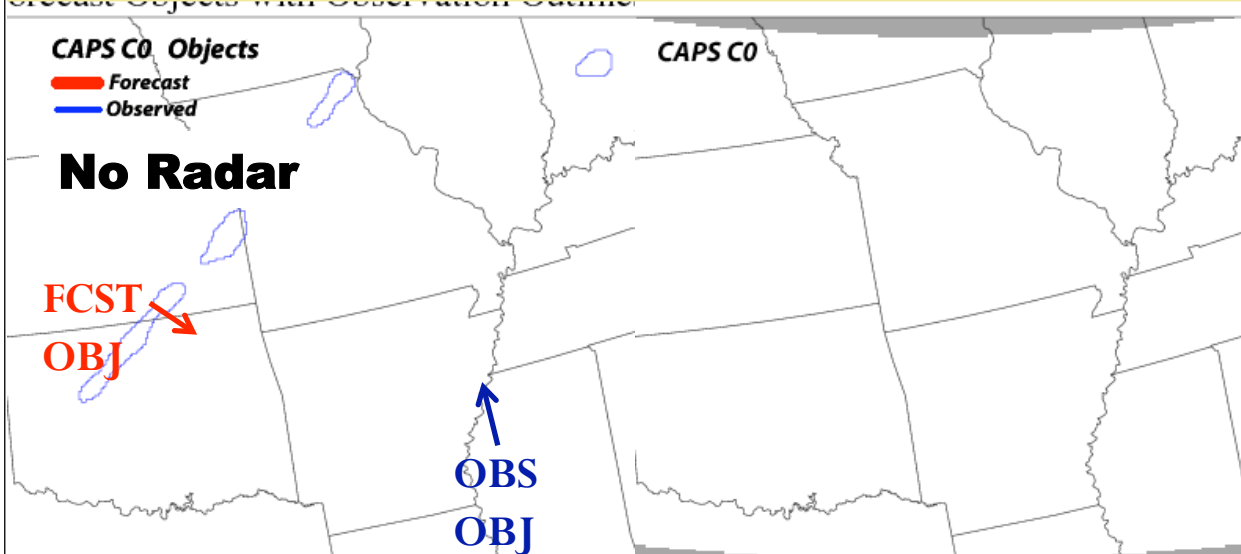
14 May 2009 Init: 00 UTC

Spatial

Thresh: 30dBZ

capsc0 Fcst and Obs Objects (solid/line) REFC Valid: 20090514_0000

capsc0 Fcst Field REFC Valid: 20090514_0000



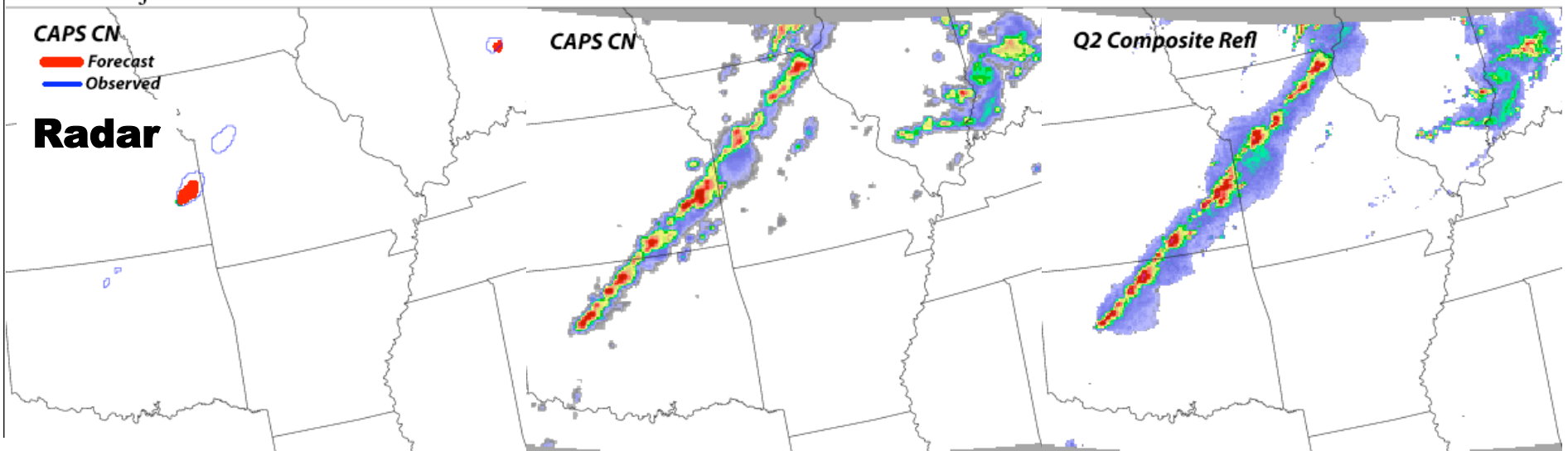
High Impact Display
allowed HWT to identify
phase and convective
mode
errors

Still working on how to
quantify objectively

capscn Fcst and Obs Objects (solid/line) REFC Valid: 20090514_0000

capscn Fcst Field REFC Valid: 20090514_0000

Obs Field REFC Valid: 20090514_0000



Objects

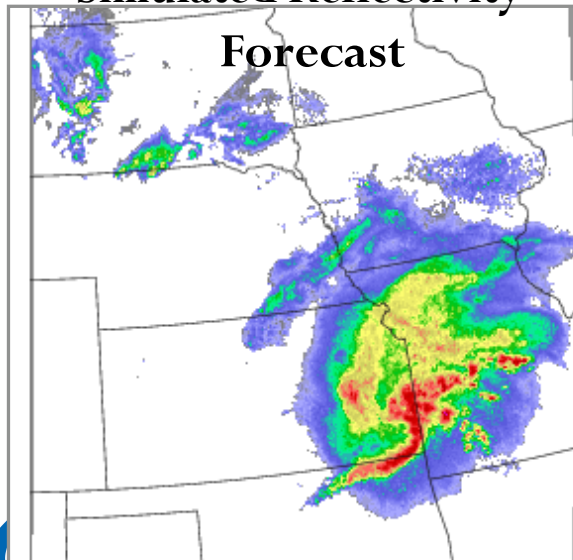
Forecast
Field

Observed
Field

2010 Objective Evaluation Foci

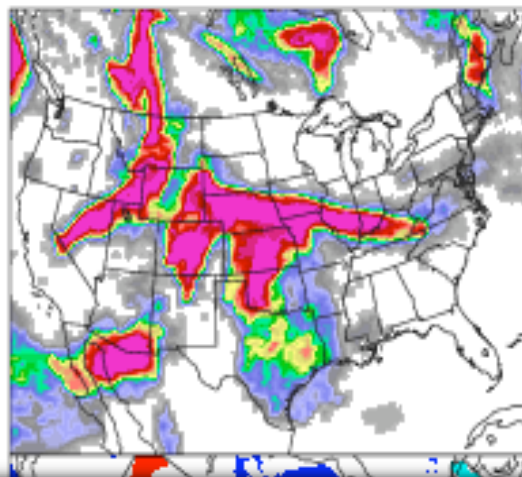
- Impact of radar assimilation on short-term forecasts of Refl. and Accum. Precip.
- Probabilistic prediction of Accumulated Precip for heavy rainfall events
- Forecast of 18dBZ radar echo top heights for aviation purposes

**Simulated Reflectivity
Forecast**



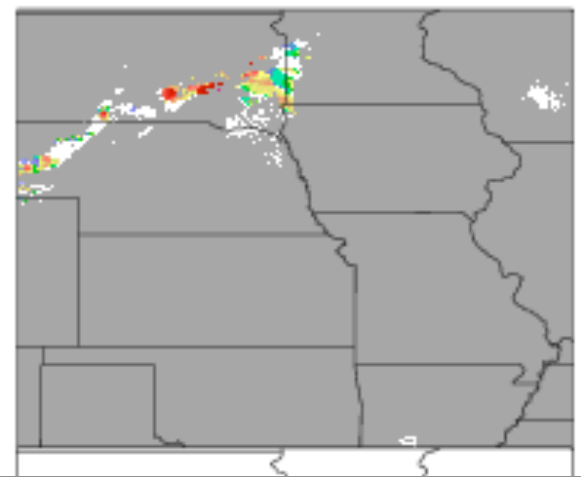
CAPS_SSEF
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**Probability > 0.01 inch
Forecast**



SREF

**Simulated Radar Echo Tops
Forecast**



HRRR

HWT SE2010 Model Evaluations

- **Models:**

- CAPS Storm Scale Ensemble Forecast (all members)
- CAPS SSEF Ensemble Products (15 members)
- HRRR
- NAM
- Short Range Ensemble Forecast (SREF) Ensemble Products
- Other models as resources allow (NSSL, MMM, etc...)

- **Obs:**

- NSSL NMQ Q2 dataset

- **Variables:**

- Reflectivity (REFC)
- Radar Echo Top Height of 18 dBZ contour (RETOP)
- 3 and 6-hr accum precip (APCP_03) and (APCP_06)
- 3 and 6 –hr probability of exceedence $\text{PROB}(\text{APCP_03} > \text{thresh})$ and $\text{PROB}(\text{APCP_06} > \text{thresh})$



2010 Fields and Variables

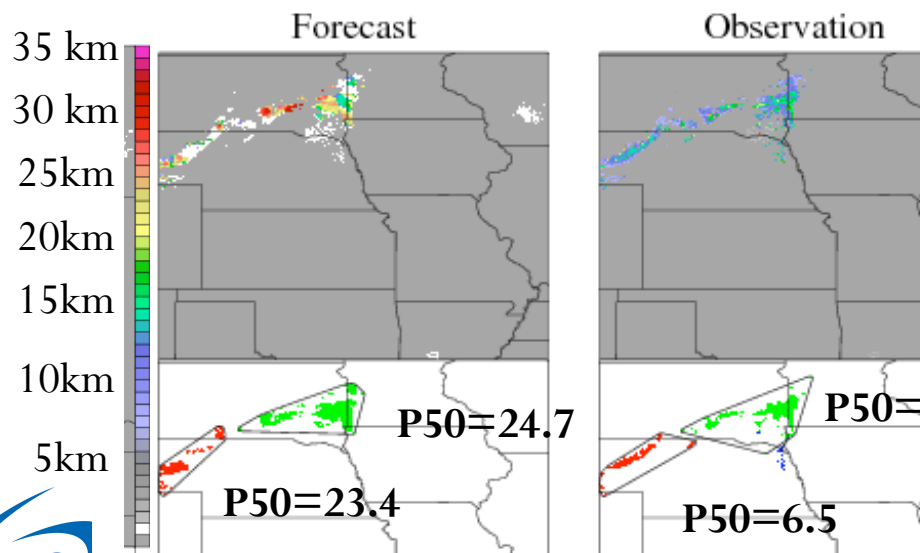
FCST Field	Observation	Traditional	Spatial	Models
Sim. Composite Refl (20,30,40,50) dBZ	Q2 Composite refl (20,30,40,50) dBZ	GSS, CSI, FAR, PODY, FBIAS	MODE objects and attributes	All avail members and baseline models
18 dBZ Echo Top	Q2 18dBZ Echo Top	GSS, CSI, FAR, PODY, FBIAS	MODE objects and attributes	All avail members and baseline models
0.25", 0.5", 1.0", 2" over 3 hrs and 6 hrs	0.25", 0.5", 1.0", 2" QPE	GSS, CSI, FAR, PODY, FBIAS	MODE objects and attributes	All avail members and baseline models
50% Prob of Exceed 0.25", 0.5", 1", 2" over 3hrs, and 6hr	0.25", 0.5", 1", 2" QPE		MODE objects and attributes	Ensemble products from CAPS, SREF,
Prob of Exceed 0.25", 0.5", 1", 2" over 3 hrs and 6 hrs	0.25", 0.5", 1", 2" QPE	Brier Score, Decomp of Brier score, Area Under ROC, Reliability	MODE objects and attributes	Ensemble products from CAPS, SREF

2010 Objective Evaluation Challenges

- Data Volume
- New Configurations
- Extending Plotting Capability

- Determining appropriate thresholds
- This one example shows a sizable intensity bias

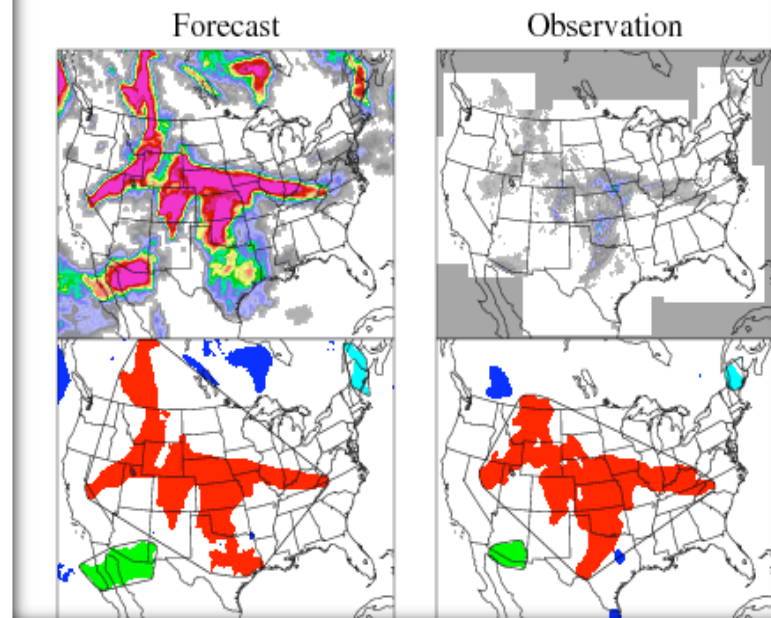
MODE: RETOP at SFC vs RETOP



HRRR

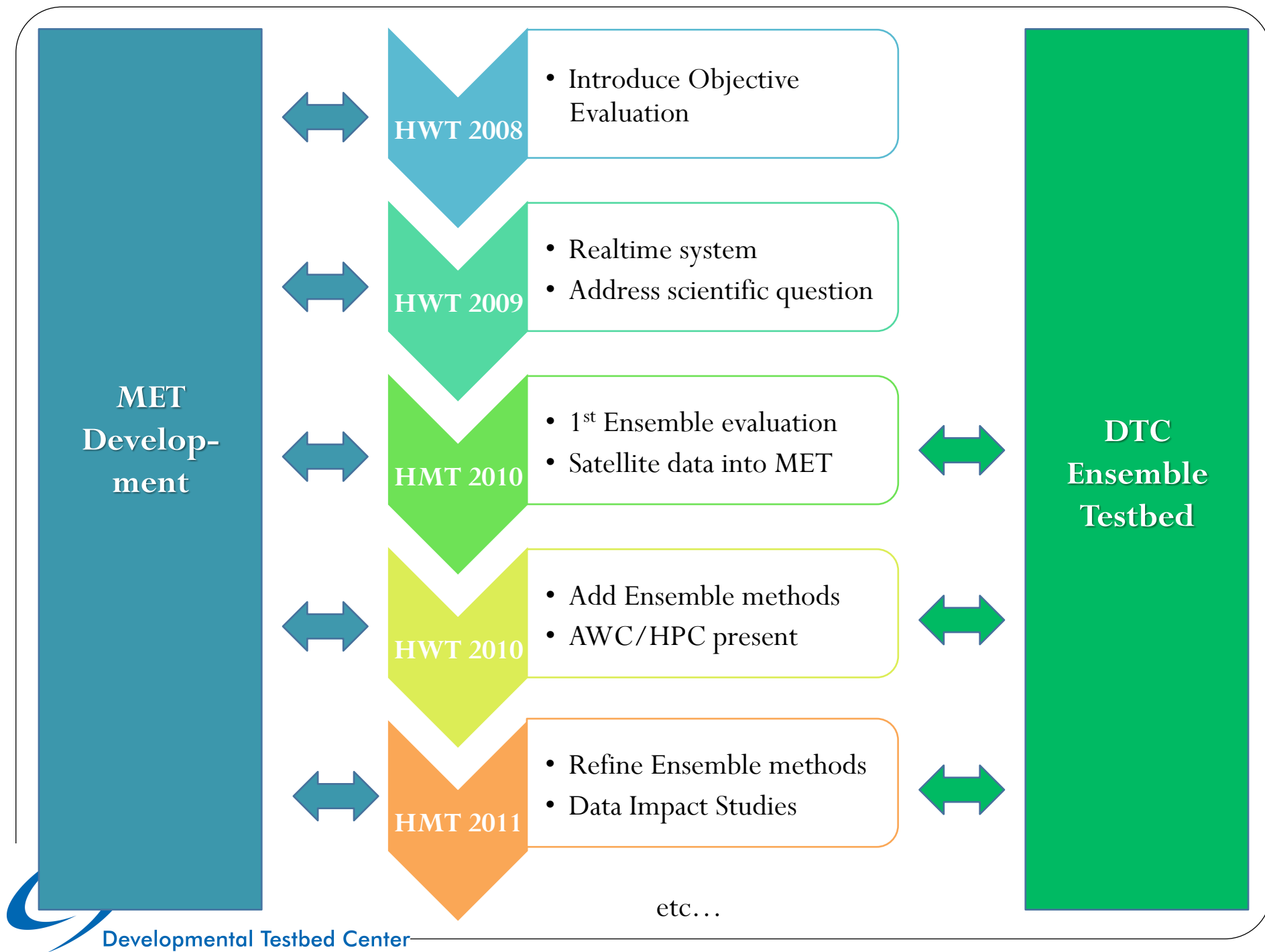
SREF

MODE: PROB(APCP_06>0.25) at SFC vs A



- Developing automated plotting of Traditional and Spatial Scores
- Determining how smooth to make the fields before thresholding

It's all about leveraging our efforts



Thanks to...

DTC Software Engineers

- Randy Bullock
- John Halley-Gotway
- Steve Sullivan
- Paul Oldenburg
- Nancy Rehak

2009-10 DTC Participants

- Jamie Wolff
- Steve Koch
- Dave Ahijevych
- Tressa Fowler
- Michelle Harrold
- Isidora Jankov

HWT Folks that helped DTC

- Greg Carbin
- Ryan Sobash
- Kevin Thomas

All the HWT Participants

*The Developmental Testbed Center is
funded by the NOAA, AFWA and NCAR*

HWT Spring Experiment website

http://hwt.nssl.noaa.gov/Spring_2009

http://hwt.nssl.noaa.gov/Spring_2010

MET website

<http://www.dtcenter.org/met/users>



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